ENERGY STAR Tenant Space

Review of Energy Estimation and Lighting Questionnaire

September 20, 2017

Charter Tenant Documents Available

- Go to www.energystar.gov/tenantrecognition
- Click on “See all Charter Tenant Resources”
- Now available:
  - Steps for Charter Tenants
  - Tenant Space Equipment Inventory
  - Questionnaire for Energy Estimation/Lighting Tool
- Check this page for updates

Today's Agenda

- The Context for ENERGY STAR Tenant Space
- Review of Expectations and Criteria
- Revised (Tentative) Timeline
- Tentative Schedule of Webinars
- Review of Energy Estimation/Lighting Analysis and Questionnaire
  - Henry Horsey, National Renewable Energy Laboratory
  - Michael Myer, Pacific Northwest National Laboratory
- Questions

Context: Energy Efficiency Improvement Act of 2015

- Directed EPA to develop recognition for energy efficient commercial tenant spaces
  - Design & Construction (D&C)
    - To be proposed after DOE study on feasibility of high performance design and construction in tenant spaces
    - Study published April 30, 2016
  - Occupancy-Based
    - Modeled on 1-100 ENERGY STAR score for whole buildings
    - Requires data collected by Energy Information Administration, not available for several years

EPA Steps to Implement Act

- Spring 2016
  - Held roundtable discussion with key ENERGY STAR partners and tenants to understand opportunities and challenges to efficiency in tenant spaces
  - Developed draft recognition criteria
  - Began working with DOE on simple tool
- Fall 2016 – Released proposed criteria for D&C recognition
  - Held stakeholder meetings in DC and San Francisco; total of 70 attendees
  - Widely circulated proposed criteria for comment; received 40 written comments
- Initial focus on office tenants

Recognition Guideposts for EPA

- Objective and credible
- Simple
- As indicative of expected performance as possible
- Encourages good, cost-effective design
- Provides opportunity for tenant-landlord engagement
- Relatively easy for EPA to administer
- Aligns with and supports ENERGY STAR whole building certification

Comments Received

- Strong support for EPA tenant recognition
- Valuable technical input on proposed criteria
- Consensus on two broad questions:
  - Should recognition be only for tenant spaces in ENERGY STAR certified buildings?
    - NO
  - Should tenants occupying spaces in existing leases be eligible?
    - YES

Review: Technical Criteria, Proposal vs Pilot

Proposal	Pilot
Estimate energy use • Use tool provided by EPA	**Estimate energy use** • Gather data needed for tool • Use tool when available (likely November)
Meter • Meters in place • Meters +/-2% accuracy	**Meter** • Meters in place • Meters +/-2% accuracy
Light efficiently • Option 1: Use EPA tool to demonstrate meet target lighting EUI • Option 2: All-LED lighting	**Light efficiently** • Gather data needed for tool • Use tool when available to calculate actual and target LEUI
Use efficient equipment • Demonstrate certain percentage of equipment is ENERGY STAR certified • Enable sleep settings	**Use efficient equipment** • Complete Equipment Inventory • Enable sleep settings
Share data • Enter space in EPA ENERGY STAR Portfolio Manager • Commit to sharing data upon landlord's request	**Share data** • Enter space in EPA ENERGY STAR Portfolio Manager • Commit to sharing data upon landlord's request
LP verifies meters and lighting in place, and reviews all other information in application	

Review: Refining the Eligibility Criteria

- Aiming for recognition of tenants in multi-tenant buildings, as those that occupy whole buildings can apply for the ENERGY STAR
  - Is occupancy of ≤ 90% of building sq' the right number?
  - Should we require buildings to include more than one **office** tenant?
- How best to define what constitutes an individual ENERGY STAR Tenant Space
  - Office suite, as proposed?
  - All space (even non-contiguous) occupied by tenant in building? But what if tenant builds out an additional floor later?
  - Other?
- Please let us know your thoughts at any time during the pilot: tenantrecognition@energystar.gov

Review: Charter Tenant Expectations

- Review all materials and participate in webinars
- Complete (*required)
  - *Equipment Inventory
  - *Energy Estimation/Lighting Tool
  - *Feedback Form
  - Application, stamped by licensed professional
  - Other documents as appropriate
- Engage in discussions with EPA as needed
- Those who submit a stamped application to EPA agree to having their organization and space publicly announced (upon achieving the recognition)

Revised (Tentative) Timeline

- Occupied Spaces
  - September-December 2017
    - Complete and submit Equipment Inventory: By November 1
    - Complete Energy Estimation/Lighting Tool Questionnaire: By December 1
    - Establish account (if needed) and enter space in EPA ENERGY STAR Portfolio Manager
  - December 2017 – January 2018
    - Use EPA tool to estimate energy use and lighting EUI (enter data from completed questionnaire)
    - Complete ENERGY STAR Tenant Space application and obtain licensed professional stamp
    - Submit completed, stamped application, along with tool results page to EPA
- Spaces in Design/Build-Out
  - As information becomes available
    - Complete each step short of obtaining licensed professional stamp on application
  - When meters and lighting are in place
    - Obtain licensed professional stamp on completed application
    - Submit completed, stamped application, along with tool results page to EPA
  - **Now**: Let us know when you anticipate lighting and meters to be in place (tenantrecognition@energystar.gov)
- Throughout Pilot
  - Comment on EPA materials, process, and any other aspect of the proposed ENERGY STAR Tenant Space recognition
- 2018: EPA awards recognition!

Tentative Schedule of Webinars

	Date	Time	Subject
1	Sept 7	1 – 2:00 pm EST	Overview, steps, process, general questions
2	Sept 20	1 – 2:00 pm EST	Energy Estimate/Lighting Questionnaire
3	Oct 12	1 – 2:00 pm EST	Updates and General Q&A
4	TBD (was Nov 16)	1 – 2:00 pm EST	Energy Estimate/Lighting Tool

Energy Estimation

Henry Horsey, NREL

Questionnaire: Energy Estimation

General Space Information
Property address
Total usable square feet of tenant space
Total floor area(GFA) of building in which tenant leases space
Total number of stories of the building (incl. basement levels)
Year building was built
Weekly operating hours
Number of workers on Main Shift (can be rounded to the nearest 5)
Number of computers (non-server; can be rounded to the nearest 5)

HVAC Questions
What is the heating fuel?
Are thermostats setback on nights and weekends? (optional)

Building Envelope Questions
Number of contiguous stories tenant space occupies (one, or more where applicable)
For which orientations does the tenant space have exterior exposure?
North
South
East
West
What percentage of exterior walls are glass? (see Instructions tab)
Does the tenant occupy the ground floor of the building?
Does the tenant occupy the top floor of the building?

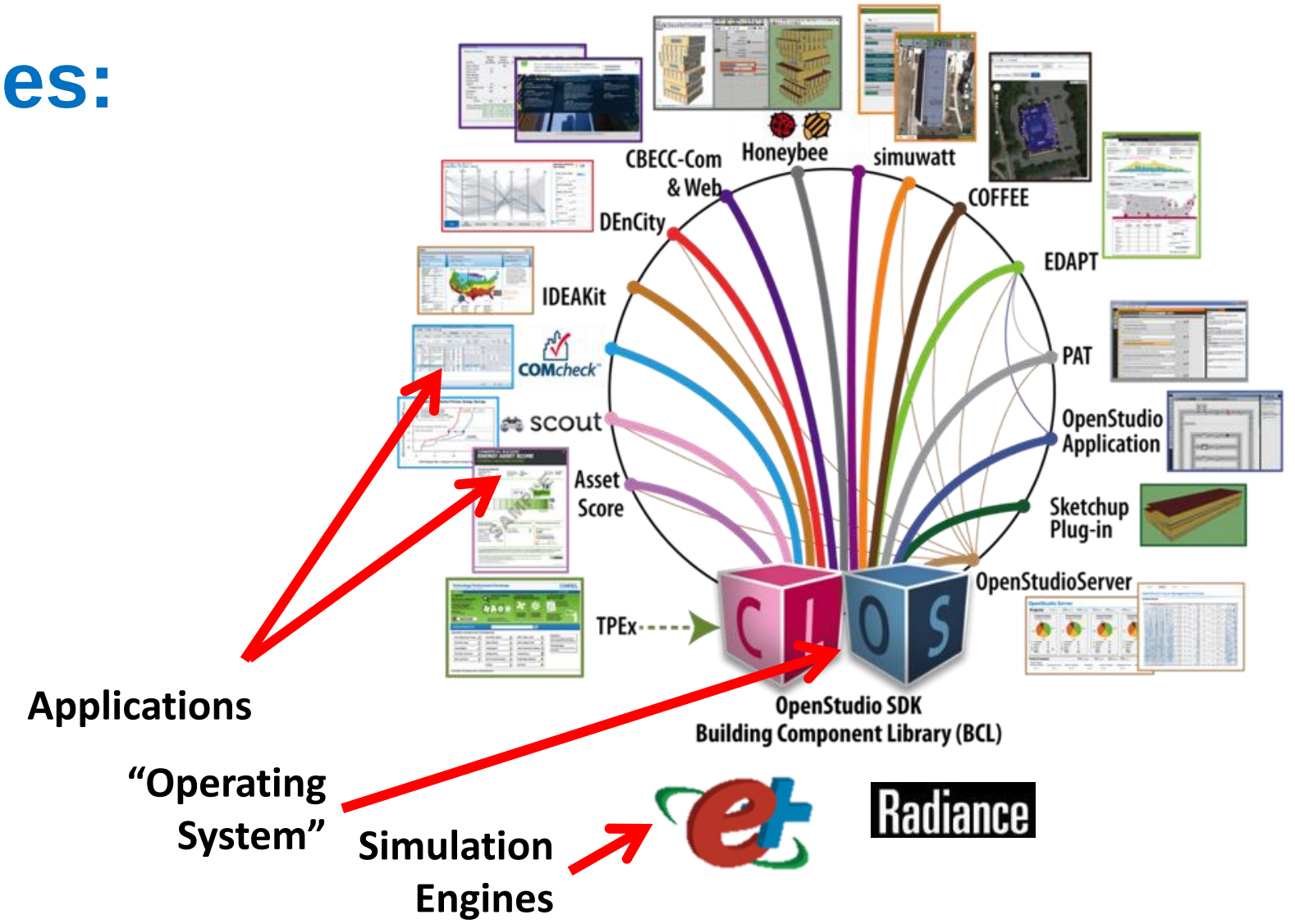
Equipment Questions
Are laptops or desktops the primary computer type?
Number of multi-media projectors?
Number of conference room large screen displays?
Number of desktop printers?
Number of full sized copy machines/ printers / scanners?
Number of refrigerators?
Number of microwave ovens?
Number of coffee makers/ beverage heaters?
Number of vending machines?
Number of servers (in small server closet, NOT in data center, if data center exists)?

Energy Estimation Outcome

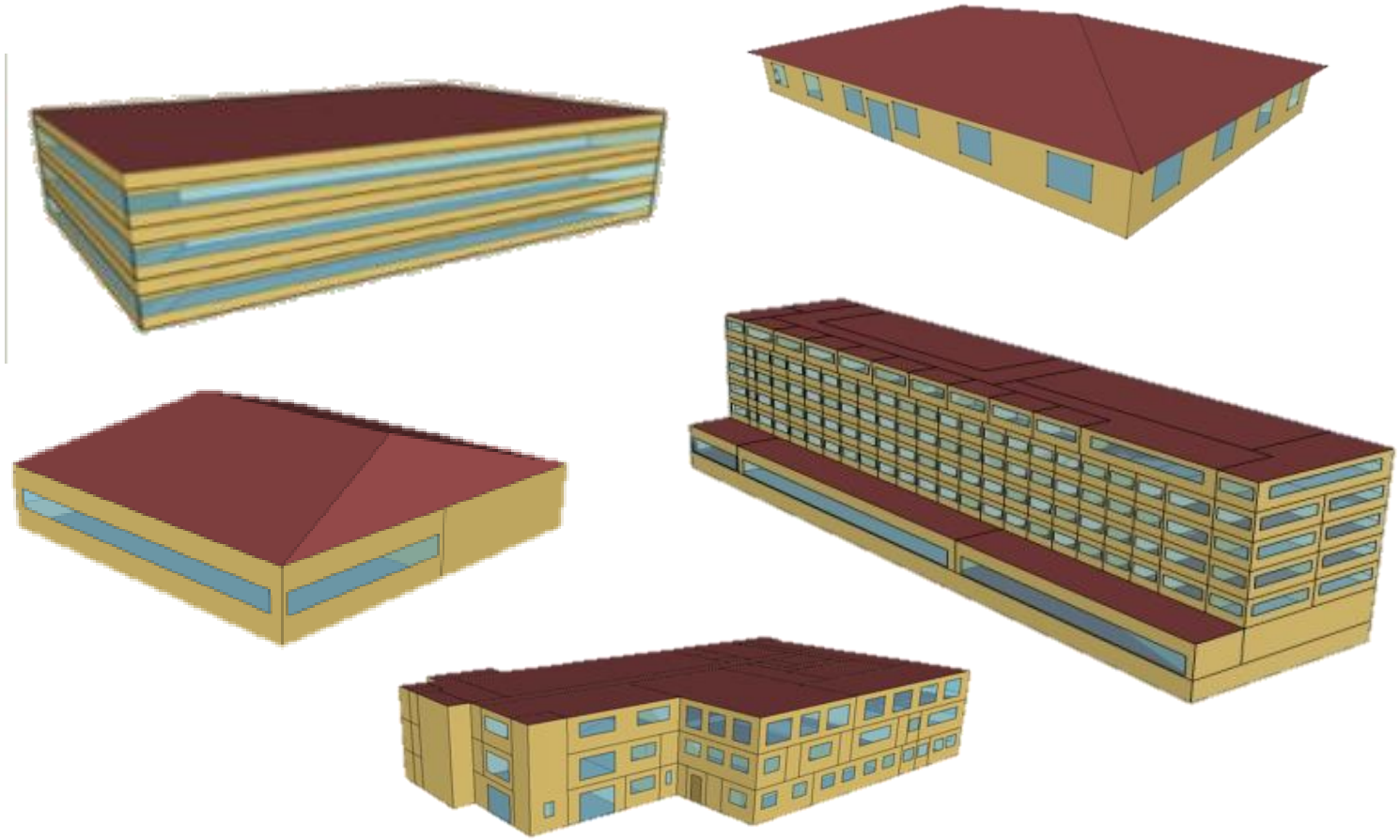
- Multiple energy use estimates provided:
  - Rough estimate of HVAC usage based on input data, ASHRAE standards, and NREL modeling assumptions
  - Estimate of electric equipment energy use in the space
    - Does not currently incorporate savings from smart power strips or other miscellaneous electric load control strategies
  - Lighting EUI estimate as generated using PNNL's lighting calculations
- Only source EUI currently available

Behind the Scenes:

- OpenStudio is a DOE funded Building Energy Modeling platform
- EnergyPlus is used to provide highly detailed analysis of complex buildings



Behind the Scenes:



- ~36,000 parametrically generated models were simulated for each of 15 ASHRAE defined climate zone
- Non-linear regression models allow those 36,000 simulations to inform lookup tables for EUI estimation
- Not all office space arraignments are included in this analysis

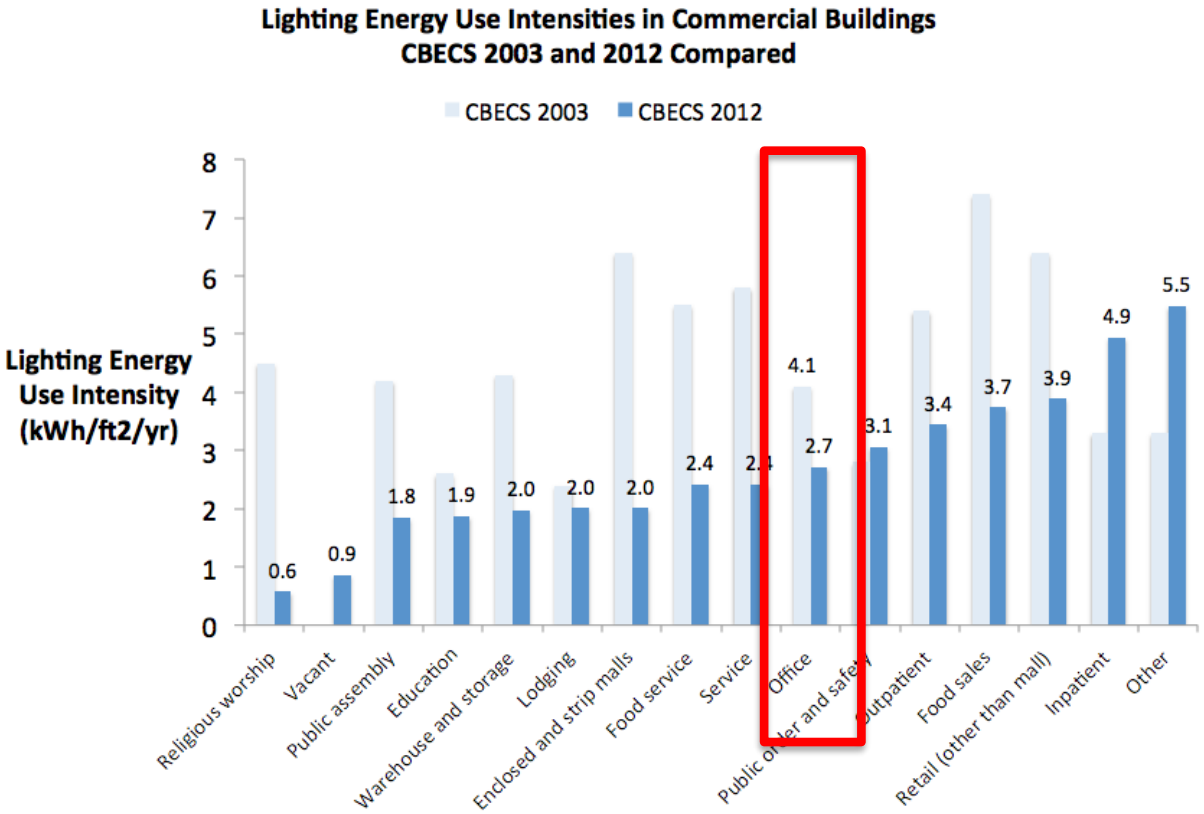
Important limitations

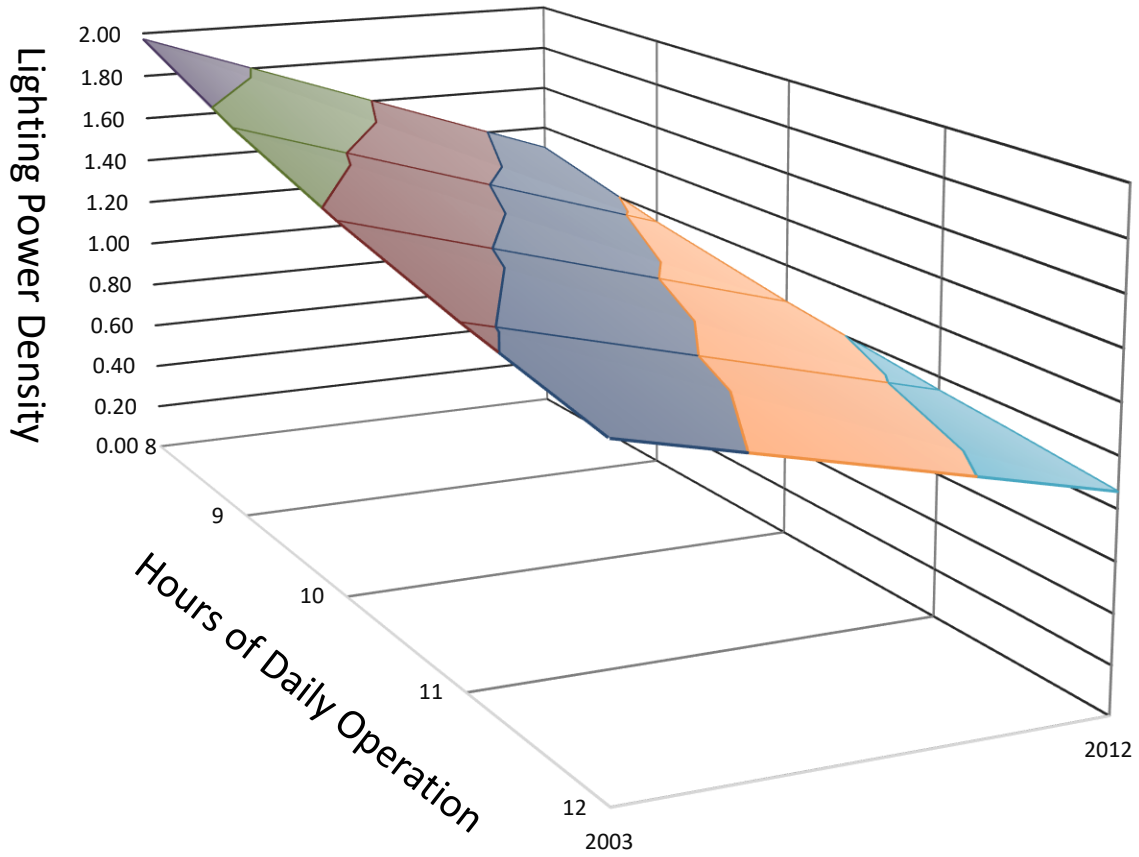
- Only 20 to 70 weekly hours of operation are supported
  - For more than 70 hour work weeks, enter 70
- Only 1, 1.5, and 2 story internally contiguous tenant spaces are supported
  - For buildings with more than 2 internally contiguous stories, an approach is being developed by EPA and NREL
- Only tenant spaces between 1,000 and 30,000 square feet were modeled
  - For tenants with over 30,000 square feet or more than two contiguous stories, an approach is being developed by EPA and NREL
- Only natural gas and electricity were modeled as heating fuels
  - For other fuels (propane, heating oil, etc.), an approach is being developed by EPA and NREL

Lighting EUI

Michael Myer, PNNL

Metric: LEUI





EPA

Pacific Northwest NATIONAL LABORATORY

$LEUI_{Target}$

- LEUI = Lighting Energy Unit Intensity
  - Units: kWh/ft^2
  - Allows for the inclusion of lighting controls and actual use
- Shortcut formula: annual operating hours x LPD / 1000
- LPD = Fixture wattage X # of fixtures / space size

EXAMPLE:

Oper. Hours per Day	8	9	10	11	12
Baseline LEUI (kWh/ft^2)	2.02	2.27	2.52	2.78	3.03
ENERGY STAR $LEUI_{Target}$ (kWh/ft^2)	1.52	1.71	1.90	2.09	2.27

$LEUI_{Target}$ Example:

	LEED CI 25% <90.1-2007 (3 pts)	ENERGY STAR for Tenant Spaces	LEED CI 30% <90.1-2007 (4 pts)	LEEDv4 25% <90.1-2010 (4 pts)	LEED CI 35% <90.1-2007 (5 pts)
LPD (W/sf)	0.79	0.75	0.74	0.72	0.68
Std. 90.1-2013	-12%	-17%	-20%	-23%	-29%
Std. 90.1-2016	-6%	-11%	-14%	-17%	-22%
Title 24-2013	-27%	-33%	-36%	-40%	-47%
Title 24-2016	-22%	-28%	-31%	-34%	-41%

ENERGY STAR for Tenant Spaces considering basing the $LEUI_{Target}$ value of an LPD value near LEED Commercial Interior (CI) [2016] 4 points or close to LEED v4 for Interior Design and Construction [2017] 4 points

$LEUI_{Target}$

- Example:
  - 2,000 square foot space
  - Typical schedule: 10-hours / day, 5 days / week
  - Baseline LEUI: 2.61
  - $LEUI_{Target:}$ 1.95

- High Efficiency Equipment Example:
  - LPD: 0.75 W/sf
  - LED equipment 112 lm/W (efficiency metric) needed
  - More than ½ LED troffers can meet this efficiency metric

- Options:
  - High efficiency equipment
  - Aggressive use of lighting controls
  - Combination of high efficiency equipment and controls

- Controls Example:
  - Typically save ≈ 20% – 30%
  - If **ALL** fixtures used controls, could meet it

Questionnaire: Lighting

ENERGY STAR Tenant Space Lighting EUI Questionnaire		
Lighting Questions	**Answer**	**Notes**
Lighting power density (LPD), if known		

Information for each lighting fixture type:
Please use the provided boxes below to input information for the light fixtures that are installed or will be installed in your space. For fixtures that contain multiple lamps (examples include fluorescent [T5, T8] or LED tube lamps), input the individual lamp wattage in the wattage field, and then provide the total number of lamps within the fixture as well as the total number of fixtures. For single lamps (example: a CFL) or integrated fixtures without lamps, the number of lamps per fixture should be equal to 1.
Feel free to add additional boxes by copying and pasting below if you have more than 6 fixture types.

Example: T-8 2x4 Fluorescent Fixture

Fixture type 1 [Manufacturer ABC 2x4 Recessed Troffer]	
– *Light source (e.g., LED, fluorescent)*	*fluorescent*
– *Wattage*	*32*
– *Number of lamps per fixture*	*2*
Total number of fixtures	*20*
Type of control (if applicable)	
Tuning?	*No*
Specialty/task lighting?	*No*

Fixture type 1 [insert name]		**Fixture type 2 [insert name]**	
– Light source (e.g., LED, fluorescent)		– Light source (e.g., LED, fluorescent)	
– Wattage		– Wattage	
– Number of lamps per fixture		– Number of lamps per fixture	
Total number of fixtures		Total number of fixtures	
Type of control		Type of control	
Tuning?		Tuning?	
Specialty/task lighting?		Specialty/task lighting?	

Q&A

tenantrecognition@energystar.gov